A central role for the small GTPase Rac1 in hippocampal plasticity and spatial learning and memory.

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Public Summary:

Scientific Abstract:
Rac1 is a member of the Rho family of small GTPases that are important for structural aspects of the mature neuronal synapse including basal spine density and shape, activity-dependent spine enlargement, and AMPA receptor clustering in vitro. Here we demonstrate that selective elimination of Rac1 in excitatory neurons in the forebrain in vivo not only affects spine structure, but also impairs synaptic plasticity in the hippocampus with consequent defects in hippocampus-dependent spatial learning. Furthermore, Rac1 mutants display deficits in working/episodic-like memory in the delayed matching-to-place (DMP) task suggesting that Rac1 is a central regulator of rapid encoding of novel spatial information in vivo.